SMITHSONIAN DEPOSIT

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[Communicated to this Journal by the Author.]

On the Purification of Mercury.

By Prof. Albert R. Leeds.

In investigations carried on in physical laboratories, and in the volumetric analysis of gases, a large quantity of mercury is employed; and as it is very readily contaminated, a method for its rapid and convenient purification is important. Such a method must provide for the removal of the three kinds of impurities which are usually present: First, foreign metals, especially lead, zinc, and tin; secondly, common dirt and dust; and thirdly, water or other liquids.

The most convenient device hitherto employed was a long glass tube, into which the mercury was poured through a paper funnel, the funnel having a pin hole at the bottom, and serving to retain the dirt and dust. The tube was partly filled with dilute nitric acid, and was provided with a stop cock below, or with a bent tube, so that a short column of mercury might balance a long column of acid.

The device herein recommended consists of a glass funnel, A, capable of holding five or ten pounds of mercury, the tube of which is cut off at a point just below the stopper of the bottle, B. Cotton wool is jammed into the tube until it fills up the neck, and bulges out at the bottom of the funnel. A short glass tube bent at right angles passes likewise through the india rubber stopper of the bottle, and is connected with a water air pump. The bottle is two-thirds filled with dilute nitric acid (one part of acid and four or five parts of water). The impure mercury poured into the funnel, A, is drawn through the cotton plug in a multitude of streams, and passes as a fine rain through the acid below. The foreign metals, if not in too large quantities, are removed by solution in the acid, and the pure mercury collects below. It is then run off through the stop cock into a second funnel, C; and, after being thoroughly dried by suction through another plug of cotton wool, it is caught and preserved in the bottle, D. A short time suffices for the almost automatic purification of a large quantity of mercury.

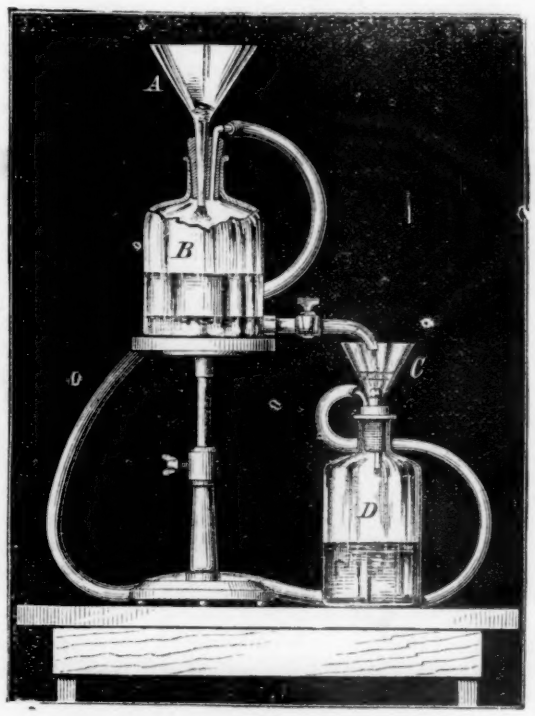
Stevens Institute of Technology, Feb. 1874.

[From Correspondence of the London *Jour. of Gas-Lighting*]

Gas Purification.

Sir: In looking over the very interesting proceedings at the late meetings of the West of Scotland Association of Gas Managers, I noticed that there was a discussion on the merits of ashes as a purifying agent for gas. For the last ten years I have used, on the first tray of my purifiers, ashes, breeze, planing-mill shavings, or any material that I could get for nothing, that would not cake, and yet arrest tarry matter before it reached the lime; but I never found any benefit as regards an increased quantity of gas purified per bushel of lime by the use of any of the above-named materials.

The most interesting part of the proceedings to me was the conversation between the president and Mr. Robb, of Haddington, in reference to the *prevention* of tarry matter reaching the purifiers. Working with high heats, this has always been a troublesome subject for me to deal with, and has led to many experiments with the view to prevention. With wet coke scrubbers we were very successful, but abandoned them on account of the deterioration in the quality of our gas. We were at one time of the same opinion as the president of the association (Mr. Key), "that increased condensing power would be a preventive." With this idea we constructed, and have used for the last five years, a condenser which consists of four cylinders 36 inches diameter by 144 inches high. In each of these are 62 two-inch tubes, same length as the cylinders. They are connected at the bottom by a base so arranged that the gas will pass up the tubes in one cylinder and down those in the next. The connection at the tops is similar, having a cover and water joint same as purifiers, to give easy access for cleaning (which is never required). These tubes are surrounded by water which is constantly being changed, the fresh supply entering at the gas outlet end of the condensers and travelling in an opposite direction to that of the gas. I am at present making, per 24 hours, 450,000 cubic feet of gas, and with this condenser I can reduce this temperature to 45° Fahr., and still I am obliged to use three inches of cinders from my ash-pans on the first tray in the purifiers, and about one inch on the bottom of the second. My idea is that this tarry matter is *condensed*, but it is held in mechanical suspension, and that to remove it we require large apparatus so that the gas will travel slowly through some medium that will give friction without increased pressure, and that can be easily cleaned, without removal from the vessels.



DEVICE FOR PURIFICATION OF MERCURY.

I trust, sir, this communication from the back woods of the North-West will be accepted in the spirit in which it is written, viz., the desire for more light on a dark subject, and that we will receive it from the scientific and practical experience of the fraternity.

James H. Walker, Eng'r and Sup't,
Milwaukee Gas-Light Co., U.S.A.
Milwaukee, Wis., U.S.A., Nov. 25, 1873.

Magnificent Hydraulic Operation.

The supply of Virginia City and Gold Hill, in Nevada, with water, has led to a most stupendous experiment, no less than the conduction of water across a valley over 1800 feet deep, and seven miles wide. Herman Schussler, Engineer.

"All the iron pipes used are coated, inside and out, with a mixture of asphaltum and coal tar, thoroughly boiled together, each separate piece being plunged and rolled about in a bath of this mixture for from seven to ten minutes before being shipped to its destination. The average diameter of the pipe is $11\frac{3}{8}$ inches, and its entire weight about 700 tons. Nearly one million rivets were used to manufacture it, and some 35 tons of lead were required in making the joints. At the point of heaviest pressure the iron is No. 0 thick, and is hot riveted with one-eighth inch rivets, there being a double row on the straight seam and a single row on the round seam. The pressure gradually decreases as the ground rises to the east and west, and the iron decreases in thickness from five-sixteenths to one-sixteenth of an inch toward both inlet and outlet.

"The inlet has a perpendicular elevation above the outlet of 465 feet, but just now only 300 feet is used, as this head will supply ten times as much as the two

towns have heretofore had. This head carries into Virginia about 2,000,000 gallons every 24 hours, and by increasing the head to its fullest capacity, the supply can be increased to 2,350,000 gallons per day. When the water is running with its present supply, as used at Virginia city, it has a pressure of 1,720 *feet perpendicular or* 750 *pounds to the square inch*. But while the extra tests were being applied the pressure was brought as high as 800 pounds to the square inch, without injuring the pipe in the least. The pipe and a joint were tested at the Risdon works before shipment, and stood a pressure of 1,500 pounds to the square inch."

Fire in a Mine at Wilkesbarre, Pa.

The "Old Baltimore Opening," so well known to nearly all visitors to the charming Wyoming Valley, has disappeared as a point of scenic interest, but now attracts probably more attention by its absence than it ever did by its existence. The Delaware and Hudson Canal Company has been "robbing" the pillars in that portion of the mine of which the "old openings" were the outcrop, and on the night of the 6th January, about four acres of the mine "caved in," crushing boilers and engines used to work an inside slope, and setting fire to the coal. As no night work was carried on, it is not supposed that any men were in the mines at the time, and as there were no buildings on the surface, no great damage has been done, except setting the mine on fire, and in such a way that it will be exceedingly difficult, if not impossible, to get at the fire and extinguish it.

There is now scarcely a mine having boilers inside, in this part of the Valley, which has not at some time been on fire. If the flues are made secure, the roof has fallen in and set the coal on fire, by knocking over the underground boilers. Putting out fires in a mine is not always possible, and even when it can be done it is invariably an exceedingly costly operation. It always greatly injures and sometimes entirely ruins a mine, and it would seem that the companies having so much at stake should prohibit the use of boilers under ground under any circumstances.—*Engineering and Mining Journal.*

Anthracite Trade.

Philadelphia and Reading Coal and Iron Company's prices of coal for January, 1874:

	Port Carbon.	Schu'k'l Haven by R. R. & Canal.	Port Clint'n
Lump, steamboat, broken.	$2·90	2·98	3·10
Egg, stove, small stove.....	3·15	3·23	3·35
Chestnut.....	2·40	2·48	2·60
No. 2 Chestnut.....	2·15	2·23	2·35
Pea	1 25	1·33	1·45

The coal mines of the Schuylkill region are putting out but very little coal. The Philadelphia and Reading Coal and Iron Company, with a stock of about 100,000 tons at Port Richmond and stocks elsewhere, is in a position to exact the reduction in wages which they claim.—*Eng. and Min. Jour.*

Sewer-Gas and Typhoids.—The *World* of Jan. 5 states that the Internationals held their weekly meeting at their headquarters in Spring street yesterday. After transacting the usual routine business, Citizen Carsie moved that a deputation should wait upon the Mayor for the purpose of enforcing the sewage laws. He said that complaints had been made to the Board of Health against a number of tenement-houses where the nuisance of sewer-gas had become so great that families had been compelled to close over the various openings to avoid the great stench that emanated from the sewers; that at No. 512 East Fourteenth street no less than six children had died within the past year from typhoid fever and other causes, owing to the malaria arising from the closets; that a number of houses in East Twenty-fifth and Twenty-sixth streets had also suffered greatly from the same cause, and although the Board of Health had been appealed to, they had as yet taken no action on the subject.

Chemical Repertory.

No. 107.—March 16, 1874.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

1039. Spontaneous ?—A fire was discovered in the New York mail-bag put on board the New Haven train at New Milford, Conn., February 25th. A package of oiled paper weighing about five pounds, the postage on which was only half-paid, was the cause of the fire.

1040. Another Gas-Well in Use.—The Kittanning *Free Press* says, the gas well at Leechburg is being utilized. The gas is used to heat four large boilers in the rolling mill at that place, which run a large part of the machinery of the mill. It produces a better heat than coal; enables the mill to make more iron, and is much cheaper than coal.

1041. Pass It Around.—The people near Farmersville, Livingston county, Mo., were scared nearly out of their wits a few weeks ago by the fall of an immense aerolite. It now lies imbedded in the ground, and is said to be 35 feet in diameter.

1042. Public Electric Light.—An illuminated cross is to surmount the spire of St. Malachi's church in Cleveland, Ohio. It will be the only one in the United States and is to be lighted up on special occasions. The steeple is 243 feet high and the lighting is done by electricity.

1043. Oil Items.—There is over one hundred and ten thousand barrels of empty iron tankage in the Modoc district.

The wells in the vicinity of Modoc continue to decline.

No fourth sand has been found at Modoc yet, reports to the contrary notwithstanding, and there seems to be little hope of finding any.—*Oilman's Journal.*

1044. The Petroleum-Locomotives.—The experiments on the Great Western Railway of Canada, in the use of crude petroleum as fuel for locomotives, are still in progress. One train a day has been run with this fuel for some time, and an accurate record kept of the quantity of oil consumed, pounds of steam, etc. A similar test is now being made with wood, and the result is awaited with interest.—*National Oil Journal.*

1045. Honesty a Bad Policy.—*Iron* tells us that "the mortality in Yarmouth is reported as extraordinarily high. Mr. Wanklyn has discovered that the water of Yarmouth is very bad. Accordingly the Water Company of that place has commenced an action for libel against Mr. Wanklyn!"

[This gentleman, we may add, is one of the most distinguished and advanced of the chemists in England.—Ed.]

Truth is great and will prevail. The advocates of truth, however, do not always prevail, and discoverers of truth, if worldly wise, will hide it under a bushel, if it is likely to hurt any vested interest or monopoly. —Ed.]

1046. Boring for New Coal.—Most readers have heard of the explorations in the South of England, made in the hope of finding new extensions of Carboniferous strata. These have resulted at least, it is said in the discovery of new and valuable gypsum beds *Iron* says:

"The celebrated sub-Wealden boring, near Bottle, England, which has reached a depth of 1000 feet in a year and a half, is to be continued by the diamond drill, which is expected to bore 700 feet further in three or four months. The Rockboring Company in England, which uses the diamond drill, has just declared a dividend of 10 per cent.

1047. English Gas-Engine.—At at a late exhibition in Manchester, there was a one-horse atmospheric gas engine, by Crossley Brothers, Manchester, the working of which, briefly described, is as follows:

Gas and air mixed in such proportions as to give a mild explosive compound, are admitted under a piston, which slides air-tight in a vertical cylinder open at the top. The compound is ignited, explodes, and the explosion drives the piston upwards. The ignited gases having increased in volume, lose their heat; their pressure becomes less as the piston rises, and when it has got to the top of the cylinder a partial vacuum is formed, and the pressure of the atmosphere makes the piston descend. The work, thus done steadily by the atmosphere during the return stroke of the piston, yields the driving power, which is transferred to the shaft by suitable mechanism.

1048. New York Gas Inspection—What the "Herald" Thinks.—The New York *Herald*, in its Albany report, lately, under the heading of "Who is Inspector of Gas Meters," says:

Few people in New York city are aware that there is such a public official as a gas-meter inspector. His existence was revealed to-day by an amendment of Charley Spencer's to the appropriation bill to give him compensation at the rate of $2,500 per year for the last three months of 1873. This inspector has held his office for four years, and is paid by the gas companies for the farcical duty of looking after the interests of the consumers. He is abolished now, though why he should have been appointed is one of the mysteries of legislation.

1049. Gas-Burner with Platinum Attachment.—A large part of the illuminating power of gas is lost in using an ordinary burner, because the temperature of the interior of the flame is too low to effect the complete combustion of the carbon. It is claimed that this can be remedied, according to a recent Belgian patent, by introducing a strip of platinum between the openings of a common fish-tail burner, against which the gas plays, and which, when heated, causes the complete combustion of the gas, and at the same time diminishes its flow. Careful photometric experiments, it is said, fix the illuminating power at double that of the same amount of gas consumed with an ordinary burner. The accidental bending of the platinum is prevented by four copper wires attached to the burner.—*Newspaper Paragraph.*

[Is not this the "Scholl perfector," regarding which a correspondent of ours recently inquired?"—Ed.]

1050. Look Out for Your Life.—The *Sanitarian* for March contains the report of the committee on hygiene of the Medical Society of the State of New York, on Defective Drainage. Some of the statements of this report are of a startling character, and show that public works, as pursued in New York and Brooklyn, are among the chief causes of the excessive mortality that prevails in many localities, by actually promoting the wholesale pollution of water and air. It would be well for all persons who care for the preservation of health to examine the maps with which this number of the *Sanitarian* is illustrated, in order that they may have a clear comprehension of the sources of disease and death under their houses and at their doors.

1051. The Iron Pipe Trade.—A meeting of the Iron Pipe Manufacturer's Association was held in Philadelphia on the 11th inst., at which nearly all the iron pipe manufacturing firms of the country were represented. Mr. Campbell Herron, of the Isabella Furnaces, Pittsburgh, was called upon to preside, and Mr. David Barr, of the firm of Morris, Tasker & Co., of this city, acted as secretary. The primary and almost sole object of the meeting was to arrive at a greater unanimity of prices. A resolution to have a uniform schedule of prices throughout the country was proposed and unanimously adopted. A general interchange of views as to the present position and

future prospects of the iron pipe, trade then took place this discussion developing great harmony of ideas, and showing that the manufacturers are very much of one mind as to their real interests. The meeting adjourned, to convene again in Pittsburgh in May next. —*Iron Age.*

1052. Gas-Music British Patent.—Improvements in musical instrument named the pyrophone. John Garret Tongue, of the firm of Tongue and Birbeck, patent agents and engineers, 34 Southampton Buildings, Chancery Lane, Middlesex. (A communication from George Eugene Frederick Kastner, member of the Committee for Inventions, Paris). March 24, 1873.—No. 1091. The pyrophone is an improved musical instrument of the description known as the chemical harmonicon. It is well known that when a pure hydrogen gas-jet burns in a glass or china tube, or other vibrating material, a pleasant soft tone or sound is produced. The characteristic novelty of this improved instrument consists in the construction of the burners, and in the combined apparatus employed to act on these burners by means of the touch on the keys similar to an ordinary piano, in order to obtain the sound or note required, or to stop it instantly as required. The burners are constructed with double oscillating branches in such manner that the two jets are brought into one by the contact of the two arms or branches, whilst at the moment the sound or note is produced the two branches are separated and form two distinct jets, which produce the vibration and consequent sound in the glass, china, or other tube which surrounds the branches of each jet or burner. These improvements in the construction of the pyrophone consist—

First—In dispensing with the inlet cock for the gas.

Second—In the means employed for dispensing with two cocks heretofore employed for regulating the passage of gas to the two branches of each tube.

Third—In a more simple arrangement of mechanism for transmitting the movement of each key to its own two corresponding branches.

1053. European Coal News.—The Vienna papers have, the *Eastern Budget* says, been agitating with some success against the high prices charged for coal in the capital. Although Austria is very rich in coal-fields, the price of coal in Vienna has lately been almost double that in the other European capitals. The papers attribute the exorbitant prices at Vienna to the action of a coal ring, of which the firm of Rothschild is the leading member, and the matter has already been taken up by the municipality of Vienna and the Diet of Lower Austria.

Iron says Feb. 7th—"That there was a dead calm in the French coal trade, prices going steadily down, yet without bringing orders: the consumer stands as yet on the defensive. At Saint Etienne the holders will not admit that a further fall has taken place. Great discontent is caused by the fact that the colliery committee of France decline to publish the result of last year's working. It is supposed by good judges that the output was about 16,500,000 tons, or 2,000,000 tons over that of 1872. In Belgium the situation is scarcely changed.

In England there has been an unmistakable, though small, lowering of price of house-coals, with the close of the winter, their cost being now but little more in London than in New York.

1054. "Heavy Oil" on Hand.—There are at the present time, in what is known as the Franklin oil district, about one hundred producing wells, producing an average of about five barrels of heavy oil per day. There is a stock of this oil at the wells, and in Franklin, of about 40,000 barrels, exclusive of 25,000 barrels held by one party, which can be fairly considered out of the market, as its owner holds it at about five dollars a barrel. Most of this 40,000 barrels is held at two dollars a barrel, and the producers are discussing the propriety of stopping their wells for sixty or ninety days, to permit the accumulated stock to work off. If this should be done this oil will undoubtedly advance very soon.—*National Oil Journal*, for December.

1055. New Patent Coffee-Pot.—John E. Weber and Peter Knutson, La Crosse, Wis.—The pot is composed of three different sections—the upper or water receptacle, the middle one, into which the gas, alcohol, or coal-oil lamp is placed, and the lower receptacle, for the coffee or other articles whichare intended to be boiled. The lower part is detachable, and the coffee, tea, etc., placed therein. The upper receptacles are filled with water, closed tightly, and the lamp then lighted. The generation of the steam forces the boiling water up through a small tube and strainer, to the lower part, extracting the strength of the coffee. The lamp is then extinguished, and the liquid slowly drawn up again into the water receptacle. The process is repeated, if the coffee is desired to be very strong. The glass bulb or tube indicates, by the passage of the liquid through it, the different stages of the cooking process. The coffee is then drawn off for use.

1056. English Petroleum-Stoves.—Messrs. Wright & Butler have introduced a very simply-constructed economic petroleum heating stove, which consists of flat-wick burners placed under a bronzed cylinder. A kettle can be placed on the top, if necessary, by simply removing the dome. It will be remembered that we some time ago reported upon our inspection of a model of this new stove, when we expressed an opinion that it could be improved in a few points of importance. We are pleased to say this has since been done, and a good petroleum stove is now produced, which we understand is coming largely into demand. A very simple portable stove for heating a kettle or saucepan is also made by this firm, and will prove useful in every household.—*Ironmonger.*

1057. Coal in Sweden.—The production of coal in Sweden has not increased very rapidly. In 1870 the quantity raised exceeded only by five per cent. the yield of the previous year. There is a prospect however, at present, that the production will be greatly increased by the discovery of large fields in the province of Skara, lying in the south of the kingdom, and through which the railway from Goteborg to Stockholm runs. Trial borings have been made, and in one case, at a depth of 560 feet, twelve different seams have been found, varying from twelve feet in thickness. Several companies have been organized to work the new mines. This discovery is of the greatest importance to Sweden, as the export of timber from that country has reached its maximum, and the demand for charcoal for smelting purposes has made wood very scarce and dear. At present, Sweden imports coal from Great Britain, but it is anticipated that she will soon export this fuel to other countries. These coal-fields, according to the opinion of eminent geologists, are widely extended.—*Jour. Soc. Arts.*

Encroachment on the Hudson and East Rivers.—In the last message of Governor Parker of New Jersey to the Legislature, the alarming encroachments of New York City and Brooklyn on these grand water-ways, are referred to. The whole nation is directly or indirectly interested in letting this go no further.

The Governor says: It appears by the survey made in 1767, a copy of which accompanies the Commissioners' report, that the width of Hudson River, opposite Castle Point, Hoboken, was then nearly 5,000 feet. Its present width at that place is about 3,000 feet. A large part of the encroachment of nearly 2,000 feet of that locality has been made within the last twenty-five years, and is entirely on the New York side of the river. The same ancient survey proves that from what is now Fourteenth street to the Battery, thence along East River to Corlear's Hook, and also along the Brooklyn shore, there have been very great encroachments. Where ships once sailed or rode to anchor there are now important business streets.

American Water-Gas Researches.

REPORT OF PROFESSORS SILLIMAN AND WURTZ.

[Continued from page 76, No. 5.]

AN EXPERIMENT ON ALBERTITE WITH THE HYDROCARBON PROCESS.

This experiment was made with a view especially to compare the effect of the delivery of the gases from the anthracite retort into the centre of the bituminous coal retort, with that of a delivery into the mouthpiece; which latter was our more usual mode of commingling the two products.

First trial; the water-gas being carried by a tube of iron three feet into the retort containing the albertite.

Fifty pounds of albertite charged in one retort, and the water-gas turned on, ran off all the product in 1 hour and 40 minutes.

Gas produced 640 cubic feet, equal to 12·8 feet per pound.

Illuminating power, in standard Argand burner, burning 3·2 feet per hour, computed for 5 feet, equal to 24·79 candles.

Volume of gas, per ton of 2,240 pounds—equal to 28,672 feet.

Second trial: the water-gas being delivered into the mouth of the other bituminous coal retort, containing a charge of—

Fifty pounds of albertite; carbonized in two hours, producing 460 cubic feet of gas, or 20,608 cubic feet per ton.

Illuminating power not determined.

By a comparison of these results, it appears that there is an important advantage in delivering the water gas in the rear of the bituminous coal charge. But too much importance must not be attached to this single result, which further experiments of the same character upon the Boghead cannel do not appear to confirm.

The Albert coal, by our experience, does not increase its yield by the hydrocarbon process, while it adds very greatly to the illuminating power of the common caking coals when these are treated by this process. The above results are too few in number to justify an absolute opinion. But, so far as they go, they afford the following comparison:

Increase in volume of gas from albertite alone by the hydrocarbon process, 28,627—14,784=13·888 cu. ft., or 93·9 per cent.

Illuminating power of Albert	=49·56 c'dl's
Illuminating power by hydrocarbon process	=24·79 "
Loss	=24·77
Total economical effect of one ton of Albert, stated in pounds of sperm, equal by ordinary process	2511·57 lbs.
By hydrocarbon process	2436·95 "
Loss by hydrocarbon process	74·62 lbs.

Or, by ratio, 2.9 per cent.

This result is not unexpected. The albertite is a very peculiar and exceptional material. Its products of destructive distillation belong to the naphtha, beta-naphtha, and ethylene series,* and it resembles the asphalts in its characters more than the coals. Its decomposition is so rapid as to render it difficult to manipulate in a coal-gas retort by itself alone. And it is highly probable that, when thus employed, its illuminating hydrocarbons are broken up into those of lower equivalents and into marsh-gas. Its true use is to add brilliancy to the common caking coals, when used *in small quantities*, and, for that purpose, it is an enriching material of the greatest value.

Grahamite.—In connection with the albertite, it is proper to mention another hydrocarbon of a somewhat similar character, which was first brought to the notice of the scientific and practical world by Prof. Henry Wurtz. It occurs like the albertite, filling a fissure in the carboniferous rocks near Cairo, in Ritchie County, West Virginia.

As this material exists in very considerable quantity, and is available to all the cities of the central parts of the United States, it is worth while to put on record here its gas-producing valne, as determined at the Manhattan company's experimental works:

100 lbs. carbonized in 1 hour and 20 minutes.

Yield of gas per lb., 6·7 cubic feet; and per ton	15,000 cu. ft.
Illuminating power of 5 cubic feet, burned in a batwing burner	28·7
Yield of coke per ton	44 bushels.
" " " "	1,056 lbs

Thirty-three per cent. of the coke is very fine. The coarse portion makes a very clean, hot fire, leaving but little hard clinker or ashes.

There was not enough of the material at hand to determine the sulphur, by the lime required to purify it. It is, however, quite sulphurous.

Analysis of the grahamite:

Volatile matter	53·5
Fixed carbon	44·5
Ash	2·0
	100·0

The total economical value of one ton of the grahamite, estimated in terms of spermaceti. 1,476 lbs.

We had no opportunity to test the Ritchie County mineral by the hydrocarbon process. But by a comparison of the total economical effects of the two, the advantage is largely with the albertite.

EXPERIMENTS WITH "PEYTONA" (WEST VIRGINIA) CANNEL COAL.

One of the most remarkable of all American coals, of the cannel variety, is that from Coal River, in Boone County, West Virginia; owned by the Peytona Cannel Coal Company, and known as the "Peytona Cannel." As this coal exists in great abundance over a considerable area, and is quite available at present at moderate prices on all the systems of inland navigation and transportation of the Central and Western States of the Union, and can even now be laid in New York in competition with foreign cannels,† we have given some attention to it in connection with the hydrocarbon process.

A careful examination of its qualities by the ordinary method of dry distillation was made at the excellent experimental works of the Manhattan Gas Light Company, in New York, with the following results:

Six charges of one-tenth ton each (equal 224 lbs.), carbonized for three and a half hours, gave repectively as follows, viz.:

1.	1,124	cubic feet,	or per ton	11,240	cu. ft.
2.	1,000	"	" "	10.000	"
3.	1,215	"	" "	12,150	"
4.	1,210	"	" "	12,100	"
5.	1,234	"	" "	12,340	"
6.	1,226	"	" "	12,260	"
A'v'ge	1,168	"	" "	11,682	"

Maximum yield on 112 pounds equal to 666 c. f or in cubic feet per ton 13,320 "

Illuminating power by 5 feet fish tail burner, under 1 inch pressure, burning 5 feet of gas per hour, 41·16 candles.

By mixing 10 per cent. Peytona gas with 90 per cent. of street gas of 14·99 candle power, burned in standard Argand, 42·79 candles.

From the maximum yield of 13,200 feet illuminating power was 32·66 candles. This is equivalent, for a 10.000 feet yield.

Refrigerated to—6° F., the candle power fell from 41·16 to 35·99 candles, burning from a fishtail burner; the loss of 5·17 candles, being equal to 12½ per cent. of its illuminating power. Another sample of larger volume, having a candle power=29.24, lost but 1.04 candles, or 6.6 per cent.

4,510 cubic feet of the gas were purified by one bushel of lime.

1,380 pounds of coke and breeze were made per ton, or 32 bushels of coke, and three bushels of breeze per ton.

The analysis of coal gave:

Volatile matter	46 per cent
Fixed carbon	41 "
Ash	13 "
	100

The coke is poor, making a dull fire and a large bulk of light ash.

The fair statement of the illuminating power of this gas for 10,000 cubic feet from 2,240 lbs. is 42 candles; equal to sperm per ton, 1,440 pounds.

The mean of six trials with 100 pound charges of Peytona coal by the hydrocarbon process, gave nearly 10 cubic feet of gas per pound, of an average candle power of 23·25 candles.

Gas from one ton	22,400 cubic feet.
Candle power of one foot	4·65 candles.
Sperm equal to one ton of coal	1785·6 lbs.

In these trials the water-gas was employed in the mouthpiece as usual: and at the rear end of the retort, alternately. There was a clear advantage in candle power in the gas when the former course was employed, and a little gain in the yield of gas in the latter. But further trials are wanted in this direction to give data which can be safely made a basis of practical operations. As at present advised, our results favor on the whole the more simple form of introducing the water-gas directly into the mouth of the bituminous coal retorts.

We are of opinion that much better results will be obtained from coal in the large way, by the hydrocarbon process, than those here quoted. These show, nevertheless, a total economical gain of 24 per cent. over the ordinary process, as estimated in the total illuminating power of the gas from one ton, converted into its equivalent of sperm candles.

BOGHEAD CANNEL.

This remarkable mineral is too well-known to all gas engineers to need any description. The illuminating power of the samples which reach this country is much less than the values assigned to it in England. But the following results are comparable among themselves, and give our own experience.

We quote from the very ample experimental data of the Manhattan Gas Light Company of New York the following working result on Boghead, which presents a fair mean of several results of a like kind:

200-lb. charges, carbonized in 3 hours; yield, per ton, 13,619 cubic feet (equal 6·07 ft. per lb.)

Illuminating power of three feet of gas, 15·88 candles; equal, for five feet standard, to 26·45 candles.

Yield of coke, per ton, 35 bushels.

Weight " " 1,378 pounds.

Number of cubic feet of gas purified to one bushel of lime, 3,400.

The coke is worthless as fuel.

ANALYSIS OF THE COAL.

Volatile matter	51·60
Fixed carbon	15·70
Ash	32·70
	100·

We deduce from the above data the value of one ton in pounds of sperm, 1,235 lbs.

EXPERIMENTS ON BOGHEAD CANNEL BY THE GWYNNE-HARRIS PROCESS.

February 10, 1869.

Charges of 100 pounds weight.

Gas from the anthracite retort turned on to the Boghead charge during two hours, alternately for each retort. The charges were carbonized in three hours. The illuminating power was determined by burning 3 feet of the gas in an Argand standard burner, drawn from the main on its way to the holder, at the close of one hour from the commencement of each charge.

Weight of coal carbonized	200 pounds
Volume of gas registered	2,100 feet.
Illuminating power, end of one hour, mean of 15 corrected observations, computed for a consumption of 5 ft. per hour (standard Argand)	28·85 c'dl's
Value of 1 cubic foot of the gas	5·77 "
Gas per 2,240 lbs (equal over 10 ft. per pound)	23,200 cu. ft.
Equal pounds of sperm per ton of coal	2,326·46 lbs.

The gas was free from carbonic acid.

In these trials the water-gas was delivered into the mouthpieces of the bituminous coal retorts.

In another trial—

100 pounds of Boghead cannel carbonized two hours gave a yield of	1,500 cu. ft.
Candle power in a 5 feet Argand	22·22
Yield per ton of 2,240 pounds	33,600 cu. ft.
Pounds of sperm equal one ton of coal	2,559.74 lbs.

February 25, 1869.

In these trials the water gas was carried through a flue constructed for the purpose over the top of the bituminous coal retorts, giving to them, in effect. the character of "diaphragm retorts," such as were originally suggested in White's patent.

First charge—100 pounds, carbonized in 2 hours.

Gas produced	1,020 cu. ft.
Illuminating power, taken when 500 ft. had passed the meter	32.45 c'dl's.

Second charge—100 pounds, carbonized in two hours.

Gas produced	1,000 cu. ft.
Illuminating power, taken when 700 ft. had passed the meter	28·78 candles

Third charge—100 pounds, same time:

Gas produced	1,100 cu. ft.
Illuminating power, after 700 feet had passed the meter	28·85 candles

Fourth charge—100 pounds, same time:

Gas produced	1,000 cu. ft.
Illuminating power	29·15 candles

Recapitulation.

400 pounds yielded	4,220 cu. ft.
Average illuminating power	29·8 candles
Gas of this power to 1 ton of 2,240 lbs.	23,072 feet.
Pounds of sperm equal to 1 ton of coal.	2,357·3 lbs.

No carbonic acid was detected in this gas.

February 26.

In comparison with the foregoing results are the following, obtained by carrying the water-gas into the mouthpieces of the bituminous coal retorts:

First charge—100 pounds, carbonized in 2 hours:

Gas produced at close of 2d hour	1,050 cu. ft.
Illuminating power at end of 1st hour.	30 67 candl's
2d. charge—100 lbs., carbonized in 2 hours	1,100 ft.
Illuminating power after 700 feet had been registered, the gas being, as in all the former cases, drawn directly from the main on its way to the holder	22·87 c'nl's
Average yield per 100 lbs.	1,075 cu. ft. 24,086 per ton
Average illuminating power	26·77 candles
Pounds of sperm equal 1 ton of coal	2,210·13 lbs.

[It is probable the candle power in the two trials last named was in reality identical, but the second test was taken a little too late in the charge to obtain a fair average.]

[To be continued.]

Analysis of Tyrconnell Gas Coal.

By Dr. Charles M. Cresson

The results of the examinations of the sample of Tyrconnell Gas Coal, Taylor County, West Virginia, are as follows:

Volatile Matter	36·3
Coke	63·8
	100

Volume of coke equal five-thirds that of coal, or 3 bushels of coal yields five bushels of coke.

Average yield of gas per lb		4.40 cubic feet.
" " "	ton	9856 "
Sulphur in ton of coal		13·11 pounds.
" " coke from 1 ton of coal		6·22 "
" volatilized in gas making.		6·89 "

Illuminating power of gas—

Five feet standard Argand equal 16·63 standard candles, or one ton of coal equal 561·9 pounds of spermaceti, burned as candles, 6 to the pound.

Ash equal 4·86 per cent. of coal—is fawn-colored, and consists principally of Alumina, and does not form a clinker—is soft and pulverulent.

This coal is one of the very best gas coals that I have examined and fully equals the celebrated Youghioghony.

The quarter per centage of ash obtained from the coke will not be observable in practice, and the amount of sulphur volatilized is not greater than that frequently yielded by the standard Penn Gas Coal.

The weight of the sample from which an average of lump and fine coal were selected for analysis, was about 1,400 lbs.

The analysis above given is an average result of what can be accomplised by the use of this coal.

Yonkers.—The Water Board contemplate a storage reservoir on the Grassy Sprain of 20,000,000 gallons capacity, and another on the Sprain of 67,000,000 gallons capacity. For the two reservoirs, sixty-nine acres of land will be required, and the cost of the work is estimated at about $78,000.

* C. M. Warren, as quoted in Dana's Mineralogy, 5th edition, page 753.

† See our Editorial pages to-day.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Petroleum Gas.

Office of the National Coal-Gas Co.,
4 Warren St., N. Y., Mar. 7, 1874.

Mr. Editor: Mr. Wren, in his letter in your Journal of the 2d inst., seems to think that his mere general assertions are positive and convincing proofs. But in his fanciful flight he has rested on his wing, just for a moment, to "settle my case in a paragraph." He says, "In reply to Mr. Allen's communication of January 2d, I must settle his case in a paragraph, and by repeating my statement, 'That the consumer demands a better light and more of it—not more gas.' The statement that to have more light you must have more gas is absurd. The customers of the Citizens Gas-Light Company of Brooklyn, that Mr. Allen referred to confidently, as using his hydrogen process, don't say so. Witness the indignation meetings that have been held in South Brooklyn the past few weeks."

Now, unfortunately for Mr. Wren's argument, if nothing further, those indignation meetings were held in reference to the gas in a district wholly separate and distinct from the Citizens Gas-light Company's district; and where they were making the gas complained of, *under the old process*, from bituminous coal. Does Mr. Wren think that he can settle my case by such a paragraph? Several months ago, the Citizens Gas-light company, as a matter of supposed economy, mixed the sediment from their oil tank with breeze or sawdust, and put it *into* their coal retorts, instead of *under* them—and discovered that like a little filth in pure water—it fouled their gas. Of course they ceased such economy; but they did not, in any wise, nor can any one else, attribute the difficulty to our process.

That company, with three of our hydrogen benches and two of their naphtha benches, have been, and *are now* making 300,000 feet of gas per day of over 20 candle power, which, mixed with their gas from six coal benches, makes their whole daily product a superior gas of 18 to 19 candles, and sometimes as high as 21 candles.

Our "Gwynne-Harris Hydrocarbon process" is the only process by which such results can be accomplished at anything like the same cost. I will not, in grandiloquent style, cite "every city in the Union" for proofs, but will simply refer those who desire *facts*, to that company (where our process has been in operation for more than ten months), with confidence that the public would rather have the evidence from them than from Mr. Wren.

However absurd Mr. Wren may deem my statement, I will venture to *re-affirm* it in the precise form in which it was made in my article of January 2d--namely: "In order that a consumer may have 'a better light, and more of it,' he must, of necessity, have *more gas than oil alone* will furnish, unless expensive apparatus is applied to increase combustion. Oil gas of 80-candle power cannot be used, except in very small quantities, with one foot burners; the excess of carbon being so great, that, from want of proper combustion, it will smoke like an Esquimaux lamp. It is therefore absolutely necessary that it shall be *diluted*."

Now, every one familiar with gas and its constituents, knows this to be true, and to such experts I submit the matter.

Out of the 300,000 feet of gas made per day, by the Citizens company of Brooklyn, as above stated, not over 50,000 feet, and, more probably, not over 40,000 feet, are made from the naphtha required for its illumination. Our three benches are therefore making from 250,000 to 260,000 feet of hydrogen per day, and all the materials required to produce it, is superheated steam and less than one ton of anthracite coal, as used and applied *exclusively and only under our process.*

Mr. Wren writes as though he thinks that the making of gas from oil is some new thing under the sun. But in this error, he may have a better moral excuse than he can possibly have for garbling a statement of mine, or attempting to settle my case by such "a paragraph" as that contained in his communication.

H. P. Allen,
President National Coal Gas Co.

Petroleum Gas—How to Measure It—The Wrong Way and the Right Way.

[Written for the National Oil Journal.]

Among the many different ways of making light from petroleum, it is natural that every inventor should claim that his way is best, and in order to prove that fact will sometimes make assertions, which, unfortunately for the inquirer, can be *apparently* proved, and cannot be readily disproved, and yet are very far from representing the true state of the case.

My investigations lead me to believe that the illuminating power of a gallon of petroleum is about equal to that of 17½ pounds of sperm. A gallon of oil or naphtha well made into gas, gives about the same amount of light as a gallon of oil burned in a good lamp, and in either case the light obtained is equal to that, within a fraction of 17½ pounds of pure sperm candles. Results claiming materially more than this should be regarded *cum grano salis*, and be scrutinized very closely.

I do not wish or intend to charge willful falsehood upon persons making such statements, for I believe, in a majority of cases they have deceived themselves, and are firmly convinced that they see clearly.

How easy this self-deception is to an enthusiastic, sanguine man, especially where his own interests or preconceived convictions are involved, I give the following general examples:

For instance, A, B, and C, have each an invention. A's process starts with twenty barrels of oil in a still, and heat is applied; five thousand feet of gas are made and measured; then the quantity of oil is measured, and it is found that nineteen barrels remain. Therefore, it is plain (Isn't it?), that a barrel of oil made five thousand, and twenty barrels would make one hundred thousand feet of gas. Any school boy could figure this up, and none but those experienced in the matter would know, that when the nineteen barrels of oil remaining in the still cooled off, they would not measure eighteen barrels, and that over two barrels of *the very cream of the material* had been taken to make that five thousand feet of gas, and before those eighteen barrels were used, it would be found that the heavier portion of the oil, settling at the bottom, could not be used by A's process at all.

B's process mixes hydrogen gas or common air with petroleum gas, and of course there is no limit to the *number of feet* B can make from a gallon of oil, unless the water or air gets scarce. B has heard that petroleum gas is of 80 or 100 candle power, so he calls his gas 80 or 100 candle gas, and tells you he can make one hundred, or two hundred, or three hundred feet of gas from a gallon of oil. His statement of feet may be correct, but the deception is in the candle power.

C's process is, in *appearance*, a little fairer than the others. He makes gas from petroleum without dilution or adulteration as B, or without expansive measure like A; but he makes a gas at low heat, heavily laden with hydrocarbon vapors, and drives it through a one foot burner under high pressure (it would smoke like a torch under low pressure), and finds that the burner gives the light of 20 or 25 candles. It is a one foot burner, burns one foot in an hour. There is the single ring put on it by the maker of burners in attestation of that fact. But C either does not know or forgets that the burner under the pressure he puts upon it consumes two feet per hour, the recognition of which little fact in his calculations would reduce his candle power one-half. So much for C's candle power. Then for his quantity. He does not measure the same gas and vapor of which he obtained any where from twenty-five to fifty feet from a gallon of oil, but he subjects another gallon of oil to intense heat and makes say, eighty feet of gas, two-thirds of the lighting power of which has been deposited in the form of carbon in the retorts, or tar in the pipes, and the gas is actually not much better than good coal gas. But it proves that he can make eighty feet (may be more) of gas to the gallon, and he has already "proved" the quality to be one hundred (may be more) candles.

Beside A, B, and C, there are others who borrow a little from each of these plans and make statements and prove them in similar ways, and with a similar enthusiastic overlooking of the truth.

To test the working of a petroleum gas apparatus fairly: First, there should be no gas or volatile hydrocarbon in the holder or between the retort and the holder. Second, the material to be used should be of carefully ascertained quantity and *quality*, and the entire amount measured should be used. Third, the measures of lighting power and of production per gallon of oil should be *accurately* made *from the same sample*. Fourth, the gas should be subjected to temperature not above zero, and should be found by *long continued trial*, to make no deposit in the pipes or burner, and to show no tendency to smoke. Fifth, the process should be simple, cheap, and safe, and should work rapidly and uniformly.

Results thus obtained are the ones upon which the comparison of various apparatus should be made. And if, under these circumstances, the gas is not permanent at all temperatures, and free from smoke or oiliness; or if there is any considerable waste (*i. e.*, carbon in the retorts or condensed matter in the pipes), or any evidence or appearance of unsafeness about the apparatus, it is not worth while to waste time in further investigation. J. Desha Patton.

Apparatus Used at the Gas Works of Vaugirard, France, for the Separation and Treatment of Ammoniacal Liquor.

It is well known that in the manufacture of coal gas there are numerous waste products which are now extensively utilized beside the coke, such as tar, ammoniacal liquor, etc., which are separated by means of refrigerators and condensers from the gas as it passes from the retorts to the gasometers. At Vaugirard these two chief products are comparatively weak in quality, and the ammoniacal liquor is scarcely worth the expense of carriage from the works. It hence became desirable to treat it so as to convert it into an article of commerce at the works. The liquor as produced, was much charged with tarry and other impurities, and in attempting to utilize it, under the old method, much offence was caused to the neighborhood, and the public health endangered. To overcome all the difficulties thus presented, the gas company went to an expense of about £4000, and eventually they succeeded in not only rendering the manufacture unobjectionable to the surrounding inhabitants, but also to the workmen employed in the establishment. According to the report issued by the local health authorities, it appears that the new arrangement was successful.

1. In separating almost completely the tarry matters from the ammoniacal liquor before the latter was introduced into the boilers for subsequent distillation with caustic lime.

2. In preventing the emission of ammoniacal vapors into the works on the addition of the lime.

3. In preventing the escape of empyreumatic vapor from the vessels, which, being charged with sulphuric acid, received the products of distillation.

The latter result was effected by allowing the fumes to pass into one of the chimneys, the interior of which never fell below a dull red heat.

To obtain the entire separation of the ammoniacal liquor from the tar, etc., the former is sent into large vessels constructed of masonry, and established in the vaults of the works. Thence the liquor is raised by means of pumps into a set of four large reservoirs

situated under the roof of the upper part of the works. The liquid having filled the first reservoir, passes from its upper surface successively into each of the remaining three. By these a series of successive separations of the tar and ammoniacal liquor are effected almost completely in the two first reservoirs; but perfected in the third and fourth. From the latter it descends by pipes into other vessels, one of which is placed at the upper part of each series of boilers. The tar thus separated is removed by an elaborate arrangement of stop-cocks and pipes, and conveyed to other works for further treatment, to convert it into a saleable article. The ammoniacal liquor is thus separated from nearly all of its previous objectionable impurities, and is ready for conversion into sulphate of ammonia. The total of surface of liquid exposed by the four reservoirs is about 100 square metres, or say 120 square yards English.

A portion of the ammoniacal liquor is passed directly from a measuring vessel into another not exposed to the action of the furnace. The necessary quantity of caustic lime is added without any sensible escape of vapor or gas. A mixture is produced by a vertical agitator, which works in an air-tight collar, also preventing any smell in the works. The backs, lined with lead, which hold the sulphuric acid, intended to receive the ammonia produced by distillation, are kept covered during the whole operation. The space in them, which exists between the surface of the liquor and the cover, is connected, by means of a pipe running underground, with one of the large chimneys, and the draught in this, which is always inside at a low red heat, carries off all offensive products.

The whole arrangement is well conceived and carried out. It is a great improvement on the previous mode of treating ammoniacal liquor adopted at Vaugirard; and has satisfied the requirements of the sanitary authorities, as well as the commercial interests of the company.—*Journal de l'Eclairage au Gaz.*

The Action of Water on Leaden Pipes.

At a recent meeting of the Academy of Sciencas at Paris, M. H. Marcy stated the result of his researches relative to the action of water on lead plate, and he came to the conclusion that the metal was attacked in certain cases. M. Bobierre has entered fully into the subject, and has attempted to define the conditions under which lead is attacked by water. He has found that under similar circumstances lead is chiefly, if not solely, acted on the pipes at places where there is combined action of air with water. It has long been known on board ship that where lead, as sheathing, etc, is exposed to that joint action, it becomes quickly corroded; but, the places where the lead is entirely immersed in water, and out of contact with atmospheric air, it sustains little or no action.

In an experiment made by the author of the paper, an analogous fact presented itself. A leaden vessel, the metal of which was excellent in quality, had been for some time in use at a hydropathic establishment; it was corroded and speedily rendered useless. On careful examination it was found that it was frequently and completely emptied; and on being refilled the water was allowed to impinge on the lead with great force from the height of about a metre above the surface of the tank. The metal was thus quickly oxidixed and converted into carbonate at the spot where the water struck it. Similarly, in leaden pipes, where vesicles or chambers of air remain, oxidation of the metal takes place. At Nantes, where leaden pipes are employed to convey the water, it has been noticed that when but a trace of chalk is present no accidents take place, provided that the metal is kept completely submerged beneath the surface of the water.

M. Bobierre consequently concludes that, with the exception of rain and distilled water, the ordinary drinking waters do not generally attack leaden pipes in a sensible manner, unless the metallic surface is alternately exposed to joint contact with air and water; and, secondly, that the greater portion of poisonous matter arising from the contact of the lead of the pipes with the water is held in suspension, and the filtration of such water through chalk will remove all injurious matter.

Here we may remark that precisely the same results were found on experimenting with the Loch Katrine water, now supplying Glasgow. When this was first employed in that city, fears were entertained lest from its purity it might attack the leaden pipes, but where the metal was completely covered with the liquid there was no danger.

M. Champoullion has confirmed these facts, as establishing the harmlessness of leaden pipes. In the entire water-conveying arrangements of the military hospitals of Paris, leaden pipes are alone employed. The water is drawn from the Seine, the Tarne, the Dhuis, the Canal of the Ourcq, and the Artesian wells of Grenelle. From 1845 to 1869, out of 100,000 military patients, received in the hospitals of the Val-de-Grace, Gros-Caillon, and Saint-Martin, not a single case of lead-poisoning occurred, and while dysentery was prevalent from the middle of August to the end of September in each year, a similar absence of lead-poisoning prevailed. A dozen large plates of lead immersed for twelve years in the water of the Seine, Marne, Ourcq, etc., left the liquid quite clear and destitute of reaction on being tested for lead.—*London Journal of Gas-Lighting.*

British Prices for Gas.

[The following is condensed editorial from our contemporary, the London *Journal of Gas-Lighting.*]

Numerous as have been the responses to our applications for information as to the price and quality of gas, in addition to the statement of share capital and dividend, which we have given in former years, a glance over the columns in our last will show that, after all, the returns are very incomplete, and do not convey the clear idea of the position of our industry that we desired to present to our readers. A chief reason, no doubt, is the novelty of our proceedings, the excuse for which is the critical state of affairs at the present moment. The absolute refusals we have met with have not been numerous. In a few cases, the reply has been that the "directors decline to furnish the information;" on which we may drop the remark that in all probability those directors will most carefully scan our pages to learn what other companies are doing. It is a common weakness of humanity to wish for an intimate knowledge of other people's affairs, while concealing as closely as possible any information as to one's own concerns In our opinion the best answer to popular grumbling a gas company can give is a candid statement of their affairs: still we can respect the opinions or the prejudices that prompt concealment. We can pardon, too, the request of a gentleman who desired a Post Office order for 7s. 6d. before he filled up the return. We hope he is not underpaid—it is fair to say that the officers of gas companies seldom are—but he is right to look out for himself.

Turning to the returns as they are, what do we find? Omitting for the moment the London companies, there appear in our list 245 statutory gas companies in England and Wales. Out of this number 58, or just about one-fourth, have arrived at their maximum price. Whatever the future of the coal trade may be, they can go no farther without parliamentary sanction. Of the rest it may be said that most are perilously near the highest price they can charge, and that a continuation of dear coal will inevitably drive them to their maximum. In these facts alone are to be found a strong argument for further general legislation on gas matters which cannot be resisted unless a great change in the coal market takes place.

With non-statutory companies in England and Wales the case is not very different. Though unrestricted as to price and quality, they are habitually worked so as to yield a less dividend than 10 per cent. —an amount reached, it will be seen, but in few cases. To keep up the modest profits of these companies, we find that 163 have been compelled to raise the price of gas in the course of last year. We must mention here that our returns from non-statutory companies are much less complete than from statutory undertakings, and it must be further remembered that a large number of advances were made in 1872. Altogether, we cannot be far wrong in estimating that one-half of the companies in the kingdom have been compelled to raise the price of gas since the advance in the price of coal commenced.

In Scotland the effects of the rise in the price of cannel are much more apparent. The names of 222 undertakings appear in our list, and it will be seen that of these 66, or nearly one-third, raised the price of gas in the course of last year. We must remark here again that the advances were numerous in Scotland in the previous year, and thus the advances in Scotland are greater in number than in England and Wales. No considerable fall, if any, in the cost of cannel coal is to be expected, and the Scottish companies will inevitably, sooner or later, have to consider whether or not it will be possible to continue an exclusively cannel supply. In the meantime they are unquestionably promoting the rapid exhaustion of a material limited in quantity, and which, so far as we can see, cannot be replaced, which is highly valuable as an auxiliary, but the exclusive use of which is undeniably wasteful. We should mention that out of the 222 companies in Scotland 218 are non-statutory; and the grumblers in London may take notice that, price and quality being compared, the cannel gas of the Chartered Company is actually cheaper than that supplied to some large towns in Scotland best situated for a cheap supply. In England and Wales it may be noticed that advances in the price of gas are most numerous in coal districts.

Our Irish returns are very incomplete, and we hesitate to draw any conclusion from them. Five statutory and 80 non-statutory companies appear in our list, and among these we have to record 18 advances in price in the course of the past year.

From the undertakings belonging to local authorities in the United Kingdom we are happy to say that we have more complete returns than from companies. There are 102 gas works belonging to these authorities, and we have replies from 65. In the case of 41 of these—that is, two-thirds of the number making a return, and four-tenths of the whole number of undertakings—an advance in price was made in the course of 1873.

The London companies are so constantly before our readers that it is hardly necessary to make any reference to them here. Most of them have been compelled to raise their price within the past year. Two have reached their parliamentary maximum, and another is endeavoring to do so by the same means. Looking, however, at the whole facts, the London companies may be said to be in as satisfactory a condition as is possible under present circumstances.—*London Journal of Gas-Lighting.*

The Beauties of Municipal Management.

The London *Gas-Journal* tells us that the gas consumers of Coleraine (Ireland) have just discovered that they are paying for the attempted removal of a bar at the mouth of the river Bann. The gas works at Coleraine, it would appear, were established by the Town Commissioners, as representing the inhabitants, and for their benefit. "They did not establish a joint-stock company for the purpose of trading in gas and making money, but they adopted the principle of a sort of co-operative society, and undertook the providing of the town with gas for the benefit of, and at the smallest expense to, the inhabitants." Now, here is a perfectly legitimate and, we will add, a highly desirable object. But in 1873, as will have been seen in our last, a considerable addition was made to the price of gas in Coleraine, and this has induced some consumers to examine the gas accounts of the town. They have discovered to their astonishment that considerable balances which ought to have been applied in reduction of price have gone to the improvemen

(impossible, it is alleged) of the navigation of the river; and, further, that a large quantity of coal bought for gas making has been used in a steam tug belonging to the commissioners, the gas works in the meantime having been allowed to get out of repair. It seems that only 5889 feet of gas per ton of coal carbonized were sold in the past year, and that residuals only produced £220 6s. 4d. This is a by no means satisfactory state of affairs, and we are not surprised that the townspeople should desire explanations —

Fuel Burning Without Smoke (Pyrolith).

A fuel burning without smoke, needing no attention after lighting, and said to be especially adapted to heating railway cars, has been patented in England It consists of a mixture of pulverized charcoal or coal with some material affording oxygen when heated, as nitrate or chlorate of potash, etc. Some cementing substance such as gum, starch, or water-glass is employed to form it into cakes, which are compressed and dried at a gentle heat. Special apparatus has been devised for its combustion.—*Newspaper.*

[It is several years since we had accounts—to be found in our columns—of the use of exactly these same mixtures, for warming railroad cars, in Germany. In the next item, from a recent source, it will be seen that these plans have been well developed in that country.—Ed.]

Warming of Railway Carriages and Stations.—It will, no doubt, be a matter of interest to most of the readers of the *Mining Journal* to learn that the question as to the warming of railway carriages has been solved at last: and that, as far as Germany is concerned, a method has been largely introduced, and has been tried in this country with success. Reference is made to Messrs. Kiesling and Berghausen's patents for warming, which it is stated are likely to be speedily adopted by some of the leading railway companies in England. These patents embrace an apparatus, and the fuel used therein, the latter consisting chiefly of chemically prepared charcoal. The effect of this mode of warming is that the railway carriages are heated throughout, the temperature being regulated at will; and wherever it has been tried in this country it has met with approval. The inventors believe that the various English companies who have already made a trial of the improved mode of heating will not be long before they adopt it, and that it will be a real boon to railway passengers, especially to those who travel long distances. The German government, through the Minister for Commerce in Berlin (Dr: Achenbach, whose name is well known to the readers of the Journal) had instructed Mr. Paul Niemeyer to examine and report officially on the various methods by which passenger carriages were formerly or are now heated, and he rejects them all, except the mode patented by Messrs. Kiesling and Berghausen in this country, and he concludes his reports with the advice that those German Railway Companies who are not using this system (which has, however, in the meantime been adopted by all leading German Railway Companies) should now be compelled to do so. From a sanitary point of view Kiesling's system is also stated to be the best; and the reasons for it are given *in extenso* in the report.—*London Mining Journal.*

Board of Liquor Examiners.—Assemblyman Daly of New York will introduce a bill, sent here by John D. Townsend, designed to prevent the sale of impure liquors. It provides for the appointment by the Board of Health in the City of New York of 27 chemists, (!) to be known as the "Board of Liquor Examiners," who are to hold office five years unless sooner removed for cause. It shall be their duty to test the quality of liquors sold anywhere in New York, and to seize and confiscate any liquor, wine, beer, or other beverage that falls below the standard of purity established by the Board. The dealers selling impure liquors are held to be guilty *prima facie* of knowing that the liquor is impure, and are subject to imprisonment not exceeding one year and to a fine not exceeding $500. The examiners are authorized at any place where liquor is sold to take samples for chemical analysis. They may appoint assistants to the number of 24, and assign the wards in which they shall do duty, but no member of the Board or assistant shall serve in the same ward more than six months consecutively. Any examiner or assistant who fails to do his duty or accepts a bribe shall be immediately removed and, on conviction, be subject to imprisonment not less than six months and a fine not less than $1000.—*Tribune*, Feb. 7.

[27 chemists is big. 24 assistants (chemists also, it is presumable) makes it bigger. Fifty odd chemists in sudden demand in one city to get fat stipends. What a country! However, the bill has not yet passed. A great IF remains.—Ed.]

Aniline Colors.—Prof. Kopp, who has recently made a careful study of the aniline colors at the Vienna Exposition, says that the manufacture of these pigments from coal tar products is making most remarkable progress. Fuchsine, constituted by a salt of rosaniline, is obtained exclusively by the reaction of arsenic acid on commercial aniline. In order to afford an idea of the enormous consumption of this violent poison in the manufacture of fuchsine, it is stated that in Germany alone the same is estimated at 3,300,000 pounds a year. It is only lately that the residues have been treated to regain the arsenic in commercial form. M. Kopp mentions as a novelty a beautiful rose red coloring matter called saffranine, which upon silk is a very brilliant dye.—*Scientific American.*

Polluted Well in Ogdensburgh, N. Y.—In one family there were five cases of scarlet fever and one death. You will, no doubt, be surprised to hear that the well and privy were both in the woodshed, and only six feet apart. I warned the head of this family over and over and over again of the consequences which would surely result, but he paid no attention to my warnings until the disease had appeared. I may also mention another fact showing the prevalence of scarlet and typhoid fevers was, without doubt, owing to the people drinking from wells the water of which was permeated by large quantities of animal and vegetable matter.—*Dr. Shearman, in Sanitarian for March.*

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MONDAY, MARCH 16, 1874.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

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CIRCULAR TO THE GAS-PROFESSION.

[The following has reached us in letter form, just as here given, with but some slight and unessential verbal alterations.—ED.]

GAS-LIGHT ASSOCIATION OF THE UNITED STATES.

President Elect,
Brigadier General CHAS. ROOME.
Secretary,
P. E. DE MILL, Detroit, Mich.

DETROIT, MICH., March 6, 1874.

Mr. Editor: Would you please call the attention of the Gas Fraternity to the meeting of this Association in the City of Cleveland, on the second Wednesday of May next. And also to the important facts that we have promises of communications from Prof. Wurtz, of the GAS-LIGHT JOURNAL, New York, J. Herzog Esq., engineer of the Metropolitan Gas Light Company of New York, and George A. McIlhenny, engineer of the Washington Gas Light Company of Washington, D. C. Jas. R. Smedberg Esq., engineer of the gas works of Sacramento, Cal., has also promised a valuable paper on a subject that will interest every member of the Fraternity—and many others are expected. A number of new members have been added since the last meeting.

Respectfully, your obedient servant,

P. E. DE MILL,
Secretary.

THE GAS-IMRROGLIO IN BROOKLYN.

Since the beginning of the passing month, the gas-tribulations in Brooklyn have assumed an aspect of much interest, so much indeed that our space will be far from adequate to do justice to the subject. We may therefore—unless something of equal importance shall supersede it—recur to it in the next issue.

It appears that a Committee of the Common Council, on lamps and gas, employed two gentlemen designated as "practical chemists"—also as "experts"—to make "tests of the quality of the gas furnished to the city by the various companies." We are uninformed as to the amount or degree of authority that attaches to the reports of the gentlemen thus employed. One of their general conclusions is that, "in their opinion, the illuminating power of the gas supplied by all the companies is much below what it should be." It is unfortunate that the city fathers of Brooklyn should not have thought it desirable to employ in this highly important, difficult, and responsible task, persons whose known skill, experience, and responsibility would have given to their report a certain weight both with the public and the gas-profession. Reiterating that we know naught, *in any regard*, either plus or minus, of the gentlemen who were employed, we should be derelict in duty did we not say that their report does not contain internal evidence of special adaptation, or adaptability to the task undertaken. To illustrate; they submit that delay "was occasioned by the necessity of importing an apparatus from Europe for test the density"! Space, or the lack of it, allows us here only an exclamation point.

A "Citizen" writes to the Brooklyn *Times* regarding some of the results, that if they "were not a barefaced fraud, they would be a broad farce." Other similar remarks have met our eyes. Mr. Thomas, Superintendent of the Williamsburgh Gas Light company, authorizes one of the reporters to state that he affirms "that our average nightly pressure is an inch and three tenths, and not fifty-seven hundredths, as is stated." These slight "specimen bricks" will illustrate the extent to which the serenity of the community has been ruffled by the stirring up of the thing in this peculiar way.

THERMOMETRY BY SOUND—A LETTER FROM PROF. MAYER.

[Our readers will remember well our illustrated report of the paper read to the New York Lyceum of Natural History by Professor A. M. Mayer, of the Stevens Institute, in which he brought forward a novel and original method of determining the temperature of a furnace-space, by the interference of sound-waves.

A Frenchman, M. Chautard, it would appear from a statement in *Les Mondes*, thinks that the method proposed by Professor Mayer is difficult in application, and suggests an arrangement which he claims to be "more suitable for practical requirements."

Suspecting that M. Chautard's modification was rather of the retrograde species, we addressed to Prof. M. a note requesting his opinion; and the reply is given below.

M. Chautard's account of his modified plan, is first copied, as translated into the columns of the *Scientific American*.—ED.]

"The sound is produced by the aid of an organ tube, Ut 4, for example, disposed with reference to a resonator which is put in relation with the two branches of a Koenig improved interference apparatus. To the movable branch is attached a long tube of copper, which enters the furnace or other locality, the temperature of which it is desired to determine. This tube returns on itself and communicates with a small manometric capsule. The fixed branch of the apparatus is terminated by another capsule, which like the first, is in relation with the same source of heat. The arrangement is completed by a revolving mirror, in which the state of the flame is seen.

"Thus disposed, if the pipes which separate the resonator from the capsules each contain an equal number of half wave lengths, the flame will be edentulated; in the contrary case, the indentations will diminish, and this as much more as the difference of length of the tubes is more nearly equal to an unequal number of half wave lengths. In the latter event, the flame takes, in the mirror, the aspect of a ribbon; and by noting the changes in its appearance the calorific state of the air in the tube in the furnace is determined. If the temperature is elevated, the length of wave augments, and a clearly defined interference is shown by the flame in the mirror. If, during the continuance of the experiment, the movable tube be gradually elongated, it will be easy to bring the flame back to its primitive state, that is, to cause the indentations to reappear. Then, by the aid of a scale previously determined and empirically translated into thermometric degrees, the degree of temperature in the tube can be easily denoted."

Professor Mayer's comment thereon is as follows:

"HOBOKEN, MARCH 5, 1874.

"Prof. Henry Wurtz—

"Dear Sir: In reply to your letter calling my attention to an extract in the *Scientific American* from *Les Mondes*, I would say:

"It appears to me that although the modification of my original apparatus proposed by M. Chautard may render it more convenient for lecture-table illustrations, yet I do not see how the practice of the measurement of temperature, as originally devised by me, is rendered easier; while the discarding of the micrometer used by me detracts from the plan as originally proposed."

Yours truly,
A. M. MAYER."

THE "PEYTONA CANNEL."

A coincidence occurs in the columns of this issue, which is accidental and rather curious. The Peytona Cannel Coal Company have inserted on this page, as will be observed, a notice calling the attention of gas-producers to their coal; while in the course of publication of the Report of Silliman and Wurtz, the account has just been reached of their experiments on the Peytona cannel. It is therefore very appropriate that we throw out a few observations on this celebrated material, the more especially as the cannels of

the Kanawha region are now attracting especial public interest.

It will be observed that the investigation here reported of this coal, by S. and W., is quite thorough, and suited to convey to a gas expert a quite full idea of the merits of the material for gas purposes. Our present impression, on reviewing the figures, is that the fairer estimate of the candle-power of the gas, for the standard volume of 10,000 feet per long ton, should obviously be 43 instead of 42 candles. The sperm-equivalent becomes then 1474, instead of 1440, which brings it quite close to one of the most celebrated English cannels, the Lesmahago, whose sperm-equivalent is 1529. This is between 3 and 4 per cent. only, higher than the Peytona. The amount of ash, 13 per cent., is not high for an American cannel.

Having examined, from time to time, many samples of gas and house cannels from the West Virginia field, among them some which are ranked highest in value, it has not been our experience, so far, to encounter any surpassing the Peytona, in average value both for gas and domestic use.

The surprising resistance to condensation by cold, of the rich gas from this coal, is worthy of special remark. As will be shown in a future instalment of the Silliman and Wurtz Report, while several 14 and 15-candle gases from caking coals lost, below zero, from 25 to 44 per cent. of their value—30 and 40-candle Peytona gases lost but 6½ and 12½ per cent.

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A copy of the above-named novel has been kindly forwarded to us by the publisher. The author therein assures her readers that the story is true in the main, and in presenting it her sole aim is to encourage those of her sex who are struggling up towards a higher moral and intellectual life, and to benefit the large mass of working women who are bravely endeavoring to earn livelihoods for themselves and others; urging them to persevere until the end is attained. Like the heroine they are capable of winning fame, wealth, love, and luxurious ease, if they will only arouse themselves and follow her example.

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Letters in reference to Coal should be addressed to the General Office of FREEMAN BUTTS, Cleveland, Ohio. 354

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Scientific Men,

and those who pay taxes for lighting our highways, are invited to examine a new invention, patented by M. B. DYOTT, which has the following points of excellence and superiority over all other means of street illumination. It doubles the power and efficiency of the gas used in it. *One* lantern with a 5 or 6 foot burner is superior to *four single top* lanterns, in which 3 or 5½ foot burners can only be used with safety (a larger burner will so heat the glass that rain will break it). It is an established fact, that one 5 foot burner will give more light than three that consume 3 feet each, or 9 feet of gas.

DYOTT'S patent **Luminous Reflecting Street Lamp** has a beautiful semi-transparent opaline PROTECTOR and REFLECTOR, which never loses its brilliancy, throws a softened light upon the upper portion of the buildings, and reflects the light, which is in all other lanterns wasted in lighting the sky, beneath, around, and where it is wanted. The top of our "CHAMPION LANTERN" being *double* the intervening air space, keeps the opaline dome cool, no matter what heat and light may be put in it, and cannot be broken by inclemency of the weather. Upon this semi-transparent dome is displayed the names of streets so distinctly, that they can be read at a great distance. The globe is egg-shaped—the strongest of formations. The lantern is so constructed, that three of them can be cleaned in the time required to clean one of the old style. They are made of copper, brass, and iron, and are ten times more durable than those now in use. Being the most durable and efficient, they are the most *economical*, and being the most beautiful, are an ornament to the city.

We are prepared to furnish these lamps, or to negotiate with Cities or Corporations, for the right to make and use them, and will be pleased to furnish any information, and illustrated circulars, upon application personally or by letter to

M. B. DYOTT,
114 South Second St., Phil'a, Pa.

Those who desire to participate in forming a Company to manufacture and handle this invention, or to purchase rights, will address as above. 349

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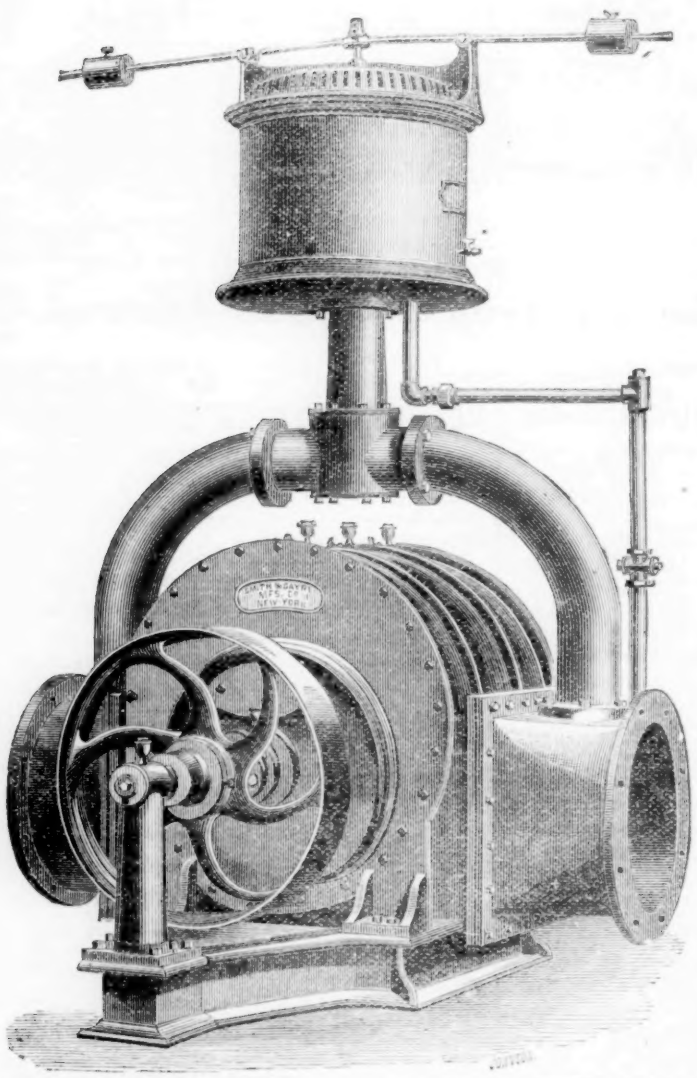

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

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The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces, the edges of the frame being grooved ¶ prevent abrasion.

The advantages of the screen are:

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The saving of lime and labor, as the Screens are not to clog, and are easily cleaned.

Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any her now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

E. DUFFEE, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why ey will not last for a long time. The *very large amount of n space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas-works, this facat of having *open Trays* would become more apparent to mangers of gas works. The digerence in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yours,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respedtfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3. 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870

EDWARD DUFFEE, ESQ.

Dear Sir: Yours of the 26th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.
SPRINGFIELD, MASS., Oct. 10, 1871.

MR. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them than with any other Screen we have used.

Yours respectfully,
THOMAS J. PISHOU

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

AMERICAN GAS SCREEN MANUFACTURING CO., HAVERHILL.

Gentlemen: The Screens bought of you work far better than any we have ever used. As a proof, we have with the same quantity of lime purified *twenty per cent.* more gas with your Screens than with any others, and the work well done. The workmen are also better pleased with them—they being light and handy to work. They also relieve the pressure very much upon the retorts, and I cheerfully give yau my experience.

Yours truly,
P. E. DEMILL, Secretary.

We give a list of some Gas-Light Companies using them.

Providence, R. I. Gas-Light Co.. Boston, Mass. Gas-Light Co.; East Boston, Mass., Gas-Light Co.; South Boston, Mass. Gas-Light Co.; Springfield, Mass., Gas-Light Co.; New Bedford, Mass., Gas-Light Co.; Manchester, N. H., Gas-Light Co.; Reading, Penn., Gas-Light Co.; Biddeford, Me., Gas-Light Co.; Hartford, Conn., Gas-Light Co.: New Haven, Conn., Gas-Light Co.; New Orleans, La., Gas-Light Co.; Savannah, Ga., Gas-Light Co.; Charleston, S. C., Gas- Light Co.; Trenton, N. J., Gas-Light Co.; Charlestown, Mass., Gas-Light Co.; Dorchester, Mass., Gas-Light Co.; Chelsea, Mass., Gas-Light Co.; Baltimore, Md., Gas-Light Co.; Manhattan, N. Y., Gas-Light Co.; Cincinnati, Ohio.; Gas-Light Co.: San Francisco, Cal., Gas-Light Co.: Albany, N. Y., Gas-Light Co.; Sacramento, Cal.; St. Joseph, Mo., Gas-Light Co.; Leavenworth, Kansas, Gas-Light Co.; Macon, Ga., Gas-Light Co.; Roxbury, Mass., Gas-Light Co.; Lansinghburg, N. Y., Gas-Light Co.; Bridgeport, Conn., Gas-Light Co.; Stamford, Conn., Gas-Light Co.; Poughkeepsie, N. Y., Gss-Light Co; Scranton, Penn., Gas-Light Co.; Lewiston, Me., Gas-Light.Co., and one hundred others.

Address **R. A. POTTER, Treas.,**
Amer. Gas Screen Man'f'g Co., Haverhill, Mass
EDWARD DUFFEE, Agent.

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GIBSON'S IMPROVEMENT

IN THE

Manufacture of Coal Gas,

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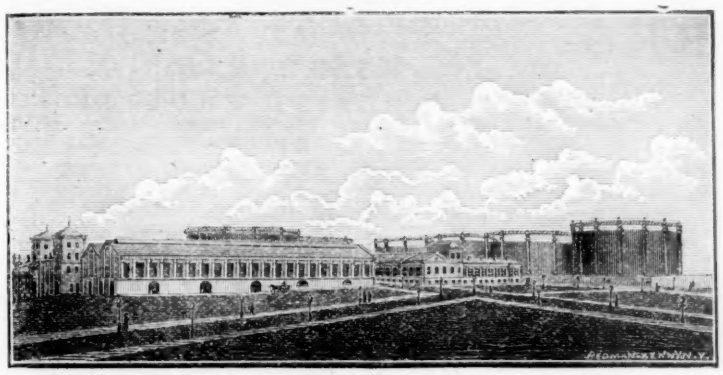
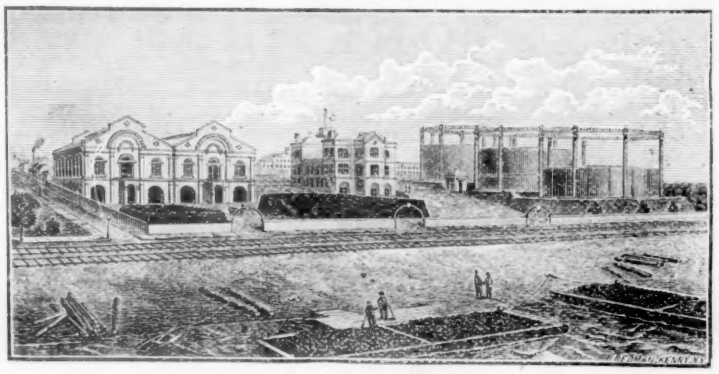
REFERENCE.—RICHARD MERRIFIELD, Esq, late Vice President MANHATTAN GAS-LIGHT COMPANY,



CINCINNATI GAS WORKS. ERECTED 1871-72-73.—WM. FARMER, ENG.



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Cost 70 cents per bushel. One bushel for each square foot of Purifier sufficient. Rights to use for life of Patents, for daily makes of gas in thousands; under 25,000 $200; under 50,000, $400; under 100,000, $500; $250 additional for each additional 50,000 per day.

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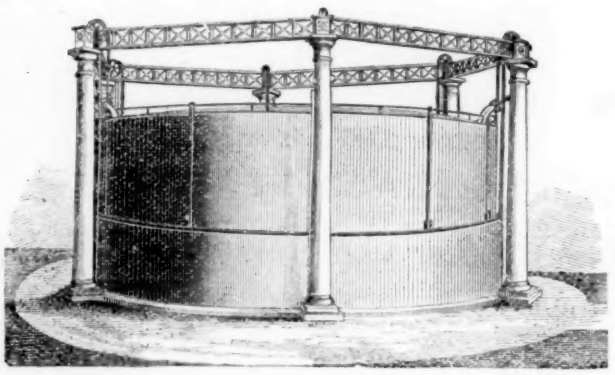

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We offer special inducements to parties wishing to purchase. My Pipe is Smooth, regular in weights, and cast vertically.

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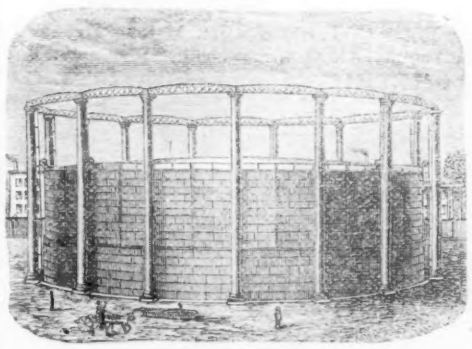

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351-1y

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☞ WORKS AT THE RAILWAY DEPOTS,

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No. 4 Warren Street, New York.

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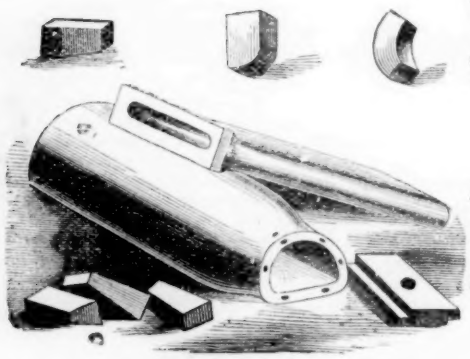

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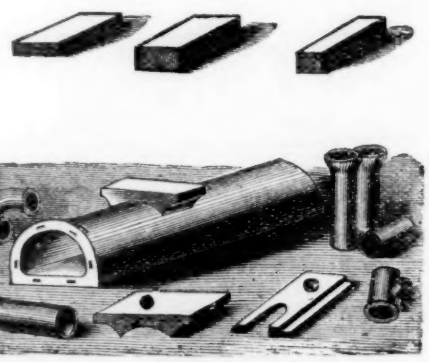

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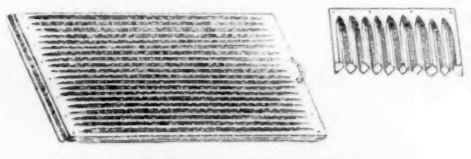

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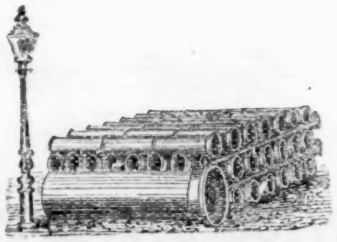

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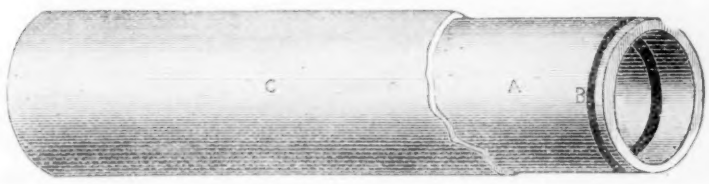

FIG. 2.

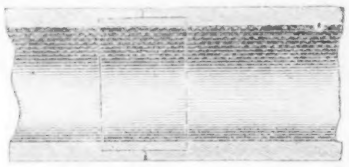

FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cemen

FIG. 2.—Thimble for Connection. FIG. 3—Horizontal Section and Connection.

Above is a cut of the

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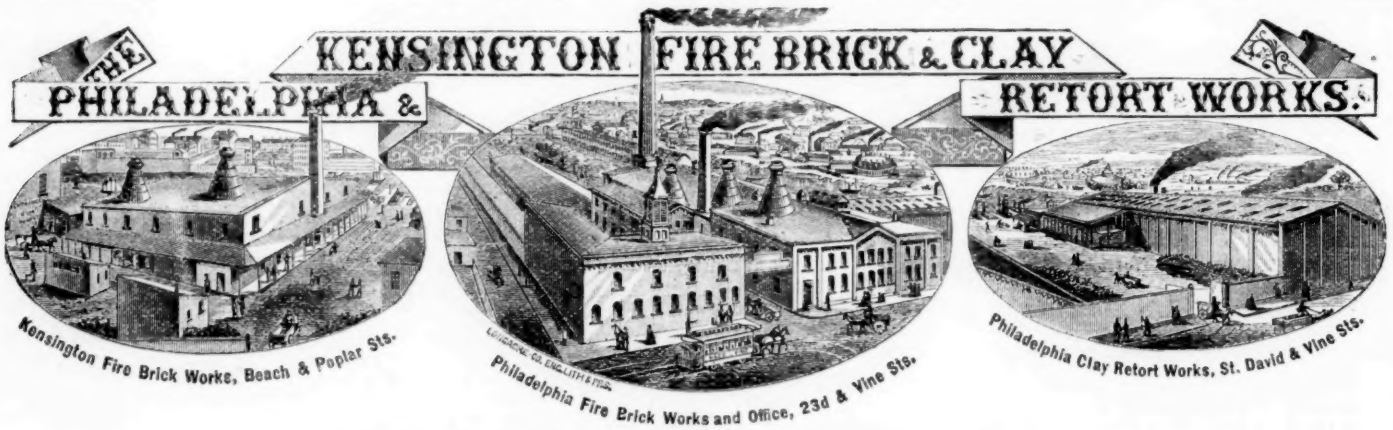
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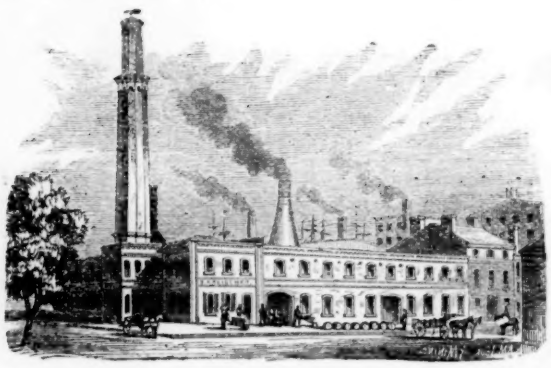

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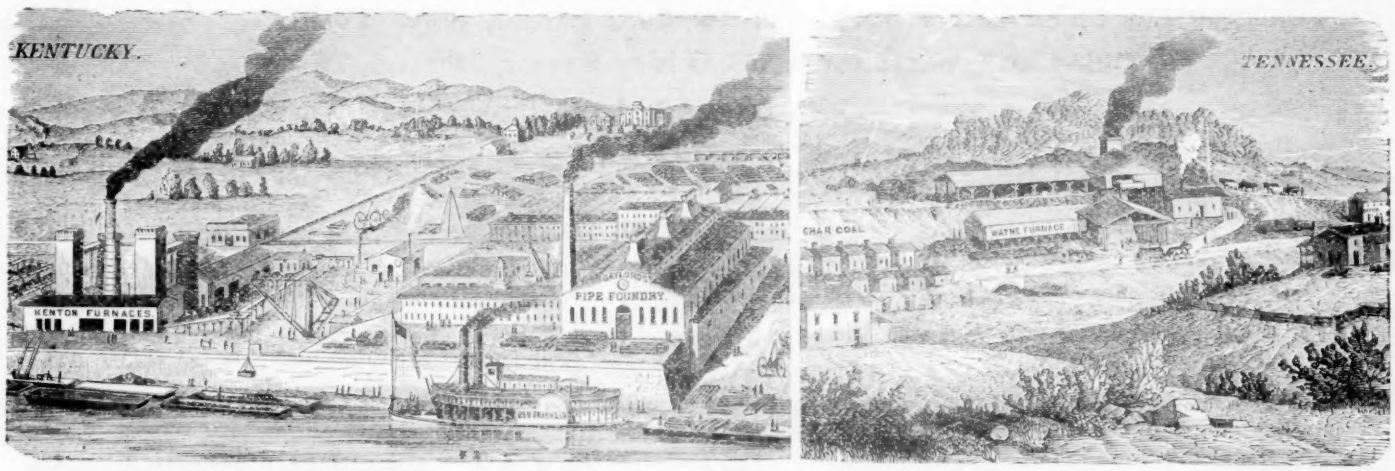

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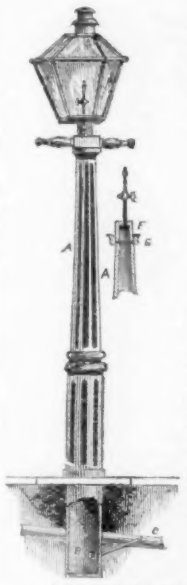

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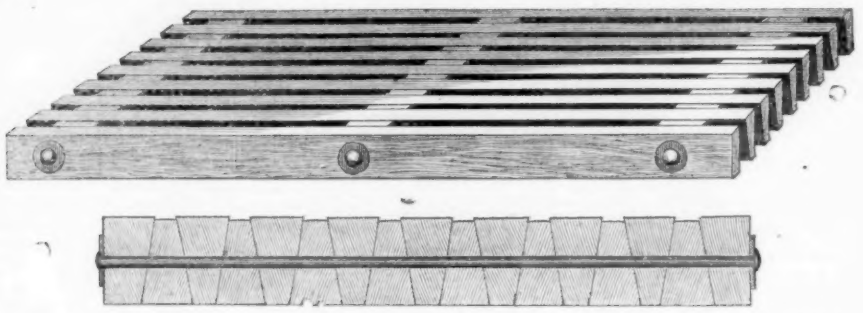

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Indiana Gas-Light Company, Pa.
Peoria Gas Company, Ill.
Montclair Gas Company, N. J.
Williamsport Gas Company, Pa.
Wooster Gas-Light Company, Ohio.

Augusta Gas-Light Company, Ga.
Huntsville Gas Company, Ga.
Chattanooga Gas Company Tenn.
Murfreesboro Gas Company, Tenn.
Hagerstown Gas-Light Company, Md.
Hanover Gas Company, Pa.
Easton Gas Company, Pa.
Uniontown Gas-Light Company, Pa.
Coatesville Gas-Light Company, Pa.
Houston, Gas Company, Texas.
Wilkesbarre Gas Company, La.
Middletown Gas Company, New York.
Washington Gas-Light Company, Pa.
Princeton Gas-Light Company, N. J
Newark Gas Company, Ohio.
Pontiac Gas-Light Company, Mich.
And numerous other Companies.

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